

assemblies and to inform those not involved in the design and construction process about the systems and assemblies. The Systems Manual expands the scope of the traditional operating and maintenance documentation to include the additional information gathered during the Commissioning Process and to provide a systems-based organization of information.

#### 1.7 DUTIES OF CONTRACTOR

a. Ensure Commissioning Specialist receives copies of all shop drawings, manufacturer's literature, maintenance information or other information as may be needed for systems to be commissioned.

b. Ensure Commissioning Specialist is provided necessary information for development of a complete Commissioning Plan and functional tests. The Contractor shall review these documents and confirm in writing to the Contracting Officer, and Commissioning Specialist any known areas of conflict or areas requiring clarifications.

c. Ensure all proposed start-up and Pre-functional Construction Checklists documentation is provided to the Commissioning Specialist.

d. Plan for and incorporate all commissioning activities into the construction schedule.

e. Provide a fully operational system per Specifications, started, verified, debugged, calibrated, balanced, tested and under automatic control.

f. Provide qualified personnel to participate in the commissioning tests, including seasonal testing. Electrical testing personnel performing electrical tests and inspections shall be trained and experienced concerning the apparatus and systems being evaluated. These individuals shall be capable of conducting the tests in a safe manner and with complete knowledge of the hazards involved. They must evaluate the test data and make a judgement on the serviceability of the specific equipment. Electrical technicians shall be certified in accordance with ANSI/NETA ETT. Each on-site crew leader shall hold a current certification, Level III or higher, in electrical testing.

g. Provide updates to all project documentation to reflect all supplemental instructions, addenda or other revisions to the project construction documents. Updates and supplemental instructions must be posted to the master set of documentation for review and reference by all Contractors and for the Commissioning Specialist's use.

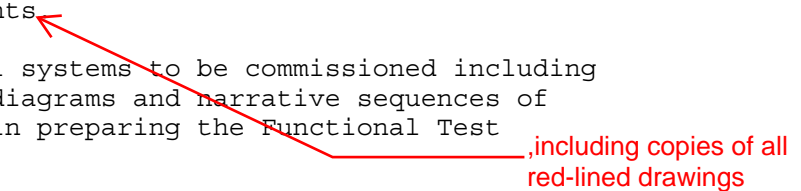
h. Provide adequate time and resources to assist Commissioning Specialist with functional testing of system to be commissioned in contract.

i. Coordinate participation of the mechanical, electrical, fire protection, life safety, controls and TAB subcontractors, and all Contractor Quality Control personnel in the commissioning process.

,including copies of all  
red-lined drawings

- v. Provide proprietary test equipment required to test all the systems and equipment in this project.
- w. Review operating and maintenance data for verification, organization, distribution and conformance to requirement of the Contract Documents.
- x. Provide necessary information/documentation to Commissioning Specialist/Firm for inclusion in the Systems Manual.

#### 1.8 DUTIES OF COMMISSIONING FIRM/SPECIALIST

- a. Obtain copies of all shop drawings, manufacturer's literature, maintenance information or other information as may be needed for systems to be commissioned.
- b. Collect the information needed for development of a complete Commissioning Plan and functional performance tests.
- c. Obtain all proposed start-up and Pre-functional Construction Checklists documentation.
- d. Obtain updates to all project documentation to reflect all supplemental instructions, addenda or other revisions to the project construction documents.
- e. Obtain submittals for all systems to be commissioned including controls system and wiring diagrams and narrative sequences of operation, in time for use in preparing the Functional Test Procedures. .including copies of all red-lined drawings
- f. Obtain preliminary TAB report, indicating all actual field values recorded, prior to initiation of functional testing.
- g. Obtain complete operation and maintenance information and as-built drawings for verification, organization and distribution.
- h. Develop the Preliminary and Final Commissioning Plans.
- i. As part of Final Commissioning Plan, develop Pre-functional Performance Test Checklists and Functional Test Procedures from Contract Documents and final equipment submittals including narrative sequences of operation, control diagrams and software code for execution with the assistance of Contractor staff as required. Refer to the sample Checklists and Functional Test Procedures in the Appendix at the end of this section for examples of the level of detail required for these documents.
- j. Perform site observations to follow installation progress and to verify system installation and readiness for testing.
- k. Review submittal of all required pre-functional and start-up documentation provided by Contractor for completeness and reasonableness. This includes installation documentation, start-up documentation, point-to-point checklists and preliminary TAB report, prior to initiation of functional testing.
- l. Schedule, direct and witness complete functional testing as

defined in the Commissioning Plan and Functional Test Procedures. All testing shall be performed by the Contractors and subcontractors, and documented by the Commissioning Specialist.

m. Conduct commissioning meetings.

n. Provide site observation, functional tests or other project reports in a timely manner.

o. Document inconsistencies or deficiencies in system operations and system compliance. System deficiencies shall be forwarded to the Contractor and Contracting Officer and documented in a Communication Log and the CQC system.

p. Coordinate the participation of Government's personnel with equipment, component and systems performance verification and participation in required training.

q. When commissioning has been successfully completed, recommend acceptance to the Government.

r. Once all functional tests have been successfully completed and all outstanding issues resolved, the Commissioning Specialist shall provide the Contracting Officer with a Final Commissioning Report of all commissioning activities and test results that occurred during the project.

~~s. Observe and document Contractor training of Government personnel on commissioned systems and equipment.~~

t. Develop Systems Manual and obtain all necessary information/documentation needed for inclusion.

#### 1.9 COMMISSIONING PLAN

The Commissioning Plan is a tool through which the commissioning process is described and incorporates the Government, Contractor and Commissioning Specialist roles relative to the commissioning process. Commissioning team members are all contractors, subcontractors, design professionals, government representatives whose participation is of benefit in the delivery of a fully functioning building.. The plan shall describe the communication, authority and responsibility of commissioning team members. The Preliminary Commissioning Plan shall include the following:

- a. The purpose of commissioning
- b. Detail the commissioning process
- c. Commissioning team member's responsibilities
- d. Schedule of commissioning activities
- e. Documentation requirements
- f. Communication & reporting protocols
- g. Systems to be commissioned
- h. Specific equipment to be commissioned

Replace paragraph s. as follows:

Oversee Contractor training of Government personnel on commissioned systems and equipment including scheduling of training, approval of training content, witnessing training, and tracking training attendance.